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IC CARD AND MEMORY PACKAGE

[ABSTRACT]

[PURPOSE] To provide an IC card having an arithmetic processing function and capable of recording large capacity data.

[CONSTITUTION]

There is provided the IC card 10 where an IC is comprised in a base card 11 and contact terminals 12 for making access to the IC are formed as the exposed terminals on the surface of the base card 11. This IC card 10 comprises: a flash memory 13 for recording the large capacity data incorporated in the base card; and contact terminals 13 formed to be exposed to a surface of the base card 11 for making access to the flash memory 13.

[CLAIMS]

[Claim 1] An IC card in which an IC is built in a base card and contact terminals for making access to said IC are formed to be exposed to a surface of said base card, comprising:

a flash memory built in said base card; and

contact terminals formed to be exposed to the surface of said base card for making access to said flash memory.

[Claim 2] The IC card according to claim 1, wherein said IC and said flash memory are connected electrically within said base card.

[Claim 3] The IC card according to claim 1, wherein said IC has a function to encrypt the data to be recorded in said flash memory.

[Claim 4] The IC card according to claim 1, wherein said IC has a function to allow read and write operations of data stored in said flash memory only when said IC is accessed with the predetermined procedures.

[Claim 5] A memory package in which a flash memory is built in a base card and contact terminals for making access to said flash memory are formed to be exposed to the surface of said base card, comprising:

an IC built in said base card; and

contact terminals formed to be exposed to the surface of said base card for making access to said IC.

[Claim 6] The memory package according to claim 5, wherein said flash memory and said IC are electrically connected within said base card.

[Claim 7] The memory package according to claim 5, wherein said IC has a function to encrypt the data to be recorded in said flash memory.

[Claim 8] The memory package according to claim 5, wherein said IC has a function to allow read and write operations of data stored in said flash memory only when said IC is accessed with the predetermined procedures.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[Technical Field of the Invention]

The present invention relates to an IC card and a memory package to be applied to a credit card and a small size memory card or the like.

[0002]

[Description of the Prior Art]

In recent years, an IC card is often introduced to a credit card of banks and a diagnostic card of medical facilities. The IC card is formed by comprising a CPU and a memory into the credit card in the vertical size of 37 mm × horizontal size of 45 mm × thickness of 0.75 mm. This IC card has the security function by performing various information processes within the card such as authentication process and encryption process. Moreover, this IC card is standardized in the

International standard organization ISO and is widely spreading.

[0003] However, only the memory in the capacity of about 8 to 32 kB in maximum can be built into the conventional IC card. However, in the case of this IC card, it can store only the necessary minimum data such as the authentication number of a user. Therefore, it has been used only for the limited purpose such as the authentication key of the security system.

[0004] For example, in the case where the IC card is used in the medical system, it may be thought for the hospital side to use the IC card of a patient as the key for authentication in order to inspect the medical information of the patient. However, since the memory in the IC card can store only the data of the authentication number, the data which requires large capacity such as the medical information of patient must be stored to another area such as a computer installed in the hospital. Therefore, the hospital is required to perform complete management of the medical information of patients. Accordingly, a patient cannot store the own medical information in his (or her) side. Moreover, there is the possibility that the medical information in the hospital side is illegally leaked without any commitment of patients.

[0005] Meanwhile, it is also possible to previously store the medical information of patients using a medium

having larger recording capacity such as a memory card. However, the memory card does not include the arithmetic processing function of the IC card and moreover is not suitable for storing of medical information because it has a problem in the security thereof. In addition, the memory card has the plane size of 54 mm × 86.6 mm like an IC card but is only about 3.3 mm in the thickness. Accordingly, the memory card cannot be applied to the existing reader/writer for IC card.

[0006] Moreover, an SSFDC (Solid State Floppy Disk Card) which has been used recently as a memory card smaller than the existing memory card is designed in the thickness of 0.76 mm like the IC card but is designed in the plane size of 37 mm × 46 mm which is different from that of the IC card. In addition, this SSFDC does not have the arithmetic processing function and therefore it cannot ensure the security thereof.

[0007]

[Problems to be Solved by the Invention]

As described above, the conventional IC card has a problem that it cannot record large size data because it is provided with only a memory having smaller capacity. Moreover, the conventional memory card and SSFDC which can record the data of large capacity have the problem that these are not yet provided with the arithmetic processing function unlike the IC card and also have the problem that these cannot use the existing

reader/writer for IC card.

[0008] The present invention has been proposed to overcome these problems and therefore an object of the present invention is to provide an IC card and a memory package which are respectively provided with the arithmetic processing function and are capable of recording the data of large capacity.

[0009]

[Means for Solving the Problems]

In view of solving the problems described above, the present invention relates to an IC card wherein an IC is built in a base card and contact terminals for making access to such IC are formed to be exposed to the surface of the base card. Namely, the IC card of the present invention comprises a flash memory built in the base card and the contact terminals formed to be exposed to the surface of the base card for making access to such flash memory.

[0010] Moreover, the present invention also relates to a memory package wherein a flash memory is built in a base card and the contact terminals for making access to the flash memory are formed to be exposed to the surface of the base card. This memory package can also be formed as the package comprising an IC built in the base card and the contact terminals formed to be exposed to the surface of the base card for making access to the IC.

[0011] In this case, since the IC and flash memory are built in the base card and the contact terminals corresponding to these elements are provided independently on the surface of the base card, one IC card (or memory package) can also be used as an IC card and a memory card.

[0012] When the IC and flash memory are electrically connected within the base card, the data can be mutually processed easily between the IC and flash memory. In addition, in the case where the data to be recorded in the flash memory with the IC is encrypted, the security function such as data protection or the like may be added to the functions as the memory card. Thereby, secrecy of the recorded data can be enhanced.

[0013] Moreover, security can further be improved by allowing the read and write operations of data stored in the flash memory only when the IC is accessed with the predetermined procedures.

[0014]

[Preferred Embodiment of the Invention]

A security memory card as an embodiment of the present invention will be described with reference to the accompanying drawings. This security card is also provided with a large-capacity memory function in addition to the information processing function (particularly, the security function) of the IC card.

[0015] Fig. 1 and Fig. 2 are plan view and cross-

sectional view illustrating a structure of the security memory card described above. A base card 11 as the main body of the security memory card 10 is made of a plastic material and has the external shape of the plane sizes of 37 mm (vertical) × 45 mm (horizontal) × 0.75 mm (thickness) conforming to the IC card specification standardized by the ISO.

[0016] On the surface of the base card 11, rectangular recesses 14, 16 are provided. The recess 14 among these recesses 14, 16 is formed at the predetermined area illustrated in the upper left part of the figure corresponding to the location of connector of the ordinary IC card. Here, it is also allowed that a magnetic stripe for recording authentication data is formed on the front surface of the base card 11 like the IC card.

[0017] The recess 14 is also provided with the IC 15. In this case, a bare chip of the IC 15 may also be mounted by sealing in direct to the recess 14 or the IC 15 which is packaged as the IC module may be mounted to the recess 14.

[0018] The IC 15 comprises, within one chip, the storage function, arithmetic operation function and control function which are required for the predetermined information process, for example, the authentication number process and encryption process or the like. In this case, the IC 15 is previously

provided with a security circuit to prevent illegal write operation of data and falsification of data.

[0019] On the surface of the IC 15, a plurality of contact terminals 12, for example, eight terminals are provided for input and output of data. These contact terminals 12 are exposed at the surface of the base card 11 and are extended almost in the same level as the surface. Moreover, terminal arrangement of these contact terminals 12 is used in common with the terminal arrangement of the IC card for making access to the IC 15 via the existing reader/writer for the IC card.

[0020] Meanwhile, the recess 16 is provided with a simultaneous erasing type EEPROM, so-called a flash memory 17. This flash memory 17 is used to store the large capacity data which cannot be stored with the IC 15. For example, when the security memory card 10 is used as a diagnostic card in a medical facility, the medical information of a patient (electronic Karte) or the like is stored to this card.

[0021] Here, a NAND type flash memory similar to that built in the SSFDC (Solid State Floppy Disk Card) is used as the flash memory 17. This NAND type flash memory is a high-speed operation and low power-consumption memory having comparatively larger capacity (2 to 16 MB) in comparison with that (8 to 16 KB) of the ordinary IC card.

[0022] The flash memory 17 is provided with a

plurality of contact terminals 13, for example, twenty-two (22) terminals for data read and write operations and these contact terminals 13 are also exposed on the surface of the base card 11 like the contact terminals 12, namely on the contact surface of the same level as the IC 15 and extended almost on the same surface.

[0023] Here, it is not required to electrically connect the IC 15 and flash memory 17 within the base card 11. However, when the IC 15 and flash memory 17 are mounted on the same circuit board by extending the circuit board portion, for example, in the OMTP, these elements can be connected electrically within the base card 11. In this case, the data may be processed easily in direct between the IC 15 and flash memory 17 by way of no PC card adapter. Moreover, it is possible that the function to inhibit the read/write operations to the flash memory 17 if the IC 15 is not accessed with the predetermined procedures is added and thereby secrecy of data stored in the flash memory 17 is enhanced.

[0024] Next, it will be described that this security memory card 10 is used by way of the PC card adapter 20 illustrated in Fig. 3. This PC card adapter 20 is used as the reader/writer of the security memory card 10. Moreover, this adapter 20 is formed in the shape of a card conforming to the PCMCIA specification and

is used under the condition that it is loaded to the PC card slot of a notebook size personal computer. The adapter is never limited only to the PC-card in the shape thereof and can also be used in a desktop type personal computer.

[0025] Moreover, a card storing portion 21 is formed to the PC card adapter 20 in order to store and take out the security memory card 10. An inserting slot 22 of this card storing portion 21 is opened at the rear end surface of the body.

[0026] Within the PC card adapter 20, an ejecting mechanism (not illustrated) is provided to take out the security memory card 10 being held, and an ejecting button 23 of this ejecting mechanism is provided in the manner that it may be depressed into the body, adjacent to the inserting slot 22 provided at the rear end surface of the body.

[0027] When the security memory card 10 is inserted into the card storing portion 21, the security memory card 10 is held under the condition that the ejecting button 23 is projected. Thereafter, when the ejecting button 23 is depressed, the security memory card 10 of the card storing portion 21 is ejected to the external side of the body.

[0028] Fig. 4 is a block diagram illustrating a system structure of the security memory card 10 and PC card adapter 20 described above. The security memory

card 10 is roughly classified into an IC card portion consisting of the IC 15 and IC connector 36 and a memory card portion consisting of the flash memory 17 and memory connector 37. The IC connector 36 and memory connector 37 are respectively formed of the contact terminals 12 and 13 illustrated in Fig. 2 and Fig. 3.

[0029] Meanwhile, the PC card adapter 20 is provided with a CPU 41, an IC interface (hereinafter, referred to as IC I/F) 42, a memory interface (hereinafter, referred to as I/F) 43, a serial I/O controller (hereinafter, referred to as SIO controller) 44, a read/write controller (hereinafter, referred to as R/W controller) 45, a memory 47 and a PCMCIA interface (hereinafter, referred to as PCMCIAI/F) 46. It is desirable that the CPU 41, SIO controller 45, R/W controller 45 and memory 47 are provided on one chip as a microcomputer.

[0030] In the case where the information is processed using these security memory card 10 and PC card adapter 20, the security memory card 10 is mounted to the PC card adapter 20 as described in regard to Fig. 3. In this case, the IC card portion is connected with the IC connector 36 via the IC I/F 42, while the memory card portion is connected with the memory connector 37 via the memory I/F 42. Subsequently, the PC card adapter 20 is inserted to a PC card slot of a personal computer not illustrated for connection thereof via the

PCMCIAI/F 46. In the case of a desktop type PC, the interfaces such as PCMCIA, ISA, USB, and PCI may also be connected.

[0031] In these cases, since the IC card portion and memory card portion of the security memory card 10 are respectively independent and each portion is respectively provided with the corresponding IC connector 36 and memory connector 37, independent access can be realized respectively to the IC card portion and memory card portion. Namely, the security memory card 10 can be treated in the same manner as the ordinary IC card or memory card.

[0032] In this case, in the IC card portion, a program for executing the predetermined information process such as the password number process and encryption process or the like is stored in a ROM 34 of the IC 15. The IC 15 is operated by execution of this program in the CPU 31 and necessary information input/output operations are performed between the PC card adapter 20 and personal computer not illustrated via the IC controller 32 and IC connector 36. Thereby, this IC card is capable of executing the password number process and encryption process.

[0033] Moreover, a RAM 33 is used to temporarily store the data being processed, while the IC controller 32 controls the input/output data for the PC card adapter 20. In addition, an EEPROM 35 is used as a data memory

of the IC 15 and it is assumed here that this RAM 33 previously stores the data such as password for the password number process and encryption key for encryption process. The particular data such as the data stored in the EEPROM 35, ciphering/deciphering program stored in the ROM 34, and the authentication program are stored, for example, under the condition not to be read from the external side in order to ensure the security as the IC card.

[0034] Moreover, in the memory card portion, the data inputted via the PC card adapter 20 from the personal computer side is received via the memory connector 37 and is then written to the flash memory 17. On the contrary, the data in the flash memory 17 is sent to the personal computer side via the memory connector 37 and PC card adapter 20. In this case, as described above, the flash memory 17 can process the comparatively large size data which cannot be recorded to the EEPROM 35 as the data memory of the IC card portion.

[0035] Meanwhile, the PC card adapter 20 executes the data process between the security memory card 10 and a personal computer by executing the predetermined program stored in the memory 47 with the CPU 41. In more practical, each necessary data process is executed via the ICI/F 42 for the IC card portion, via the memory I/F 43 for the memory card portion, and via the PCMCIA I/F 46 for the personal computer. The R/W controller

45 controls the read/write processes for the IC card portion and memory card portion of the security memory card 10, while the SIO controller executes the serial/parallel conversion of the data.

[0036] Moreover, the security memory card 10 can be operated through cooperation of the IC card portion and memory card portion. For example, when the IC card portion has the encryption process function, the data to be recorded to the flash memory 17 is first transmitted to the IC card for the encryption. The encrypted data is once returned to the PC card adapter 20 from the security memory card 10 and it is then sent to the memory card portion for storing to the flash memory 17. When it is requested to read the data written into the flash memory 17, the data is first deciphered with the IC card portion and the deciphered data is then outputted to a personal computer. As a result, the security function such as the data protection or the like can be added to the function of the security memory card 10 as the memory card. Namely, still higher security can be ensured in comparison with the case where the conventional IC card or memory card is used individually.

[0037] As described above, in the security memory card 10 of this embodiment, the IC 15 having the security function and the large capacity flash memory 17 having the memory function are mounted on the same base card

11 and the IC connector 36 and memory connector 37 are provided corresponding to these elements. Accordingly, only one card may be used as the IC card and the memory card.

[0038] Since the external shape and the mounting location of the security memory card 10 are identical to those of the IC card, at least the IC 15 may be used in the reader/writer for the conventional IC card.

[0039] Moreover, since the memory capacity which is comparatively as large as about 2 to 8 MB can be used with the flash memory 17 even in the same size as the conventional IC card, it is now possible, for example, that medical information of patient can be recorded to the diagnostic card as the electronic Karte of medical facility and transaction record can be stored to the authentication/certificate cards for financial use.

[0040] Moreover, since it is also possible that an encryption key or protocol can be set, for example, for every security memory card 10 and the data to be stored in the flash memory 17 can be encrypted with the IC 15 by using the IC card portion and memory card portion through cooperation thereof, higher security can be realized in comparison with that when only the IC card or memory card is used.

[0041] The present invention is never limited only to the embodiment described above and allows various changes and modifications. In the embodiment described

above, there has been described an example that a large capacity memory is additionally provided to the IC card by forming the base card 11 in the same shape as the IC card. For example, however, it is also possible to add a security function to the SSFDC by forming the base card 11 in the same shape as the SSFDC. In this case, the mounting location and arrangement of signals of the flash memory 17 are determined corresponding to the specifications of the SSFDC.

[0042] Moreover, in this embodiment, the contact terminals 12 of the IC 15 and the contact terminals 13 of the flash memory 17 are exposed on the same surface of the base card 11, but these contact terminals 12 and 13 may also be exposed to different surfaces of the base card 11.

[0043] In addition, in above embodiment, there is described an example that the card adapter 20 is used as the reader/writer of the security memory card 10. However, the reader/writer can also be comprised in direct in the electronic devices such as personal computer, mobile terminal and digital still camera or the like.

[0044]

[Effect of the Invention]

As described above, according to the present invention, since the IC and flash memory are provided within the base card, the arithmetic processes can be

executed and the large capacity data can be recorded using only one IC card (or memory package).

[0045] Moreover, the data can be processed easily between the IC and flash memory by electrically connecting the IC and flash memory within the base card. In addition, secrecy of the data stored in the flash memory can be enhanced and security thereof can also be improved by encrypting the data to be recorded to the flash memory with the IC and by allowing the read and write operations of data stored in the flash memory only when the IC is accessed with the predetermined procedures.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[Fig. 1] A plan view illustrating a structure of a security memory card of an embodiment of the present invention.

[Fig. 2] A cross-sectional view illustrating the structure of the security memory card of the same embodiment.

[Fig. 3] A diagram illustrating the same embodiment and the external view of an AC card adapter used in the same embodiment.

[Fig. 4] A block diagram illustrating the same embodiment and a system structure of an AC card adapter used in the same embodiment.

[Description of the Reference Numerals]

10: Security memory card;

11: Base card;

12, 13: Contact terminal;

14, 16: Recess;

15: IC;

17: Flash memory;

ＩＣカードおよびメモリパッケージ

特開平１０－３３４２０５

Fig.1
【図1】

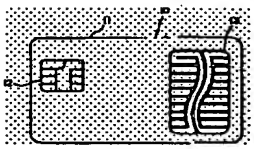
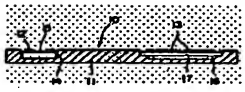
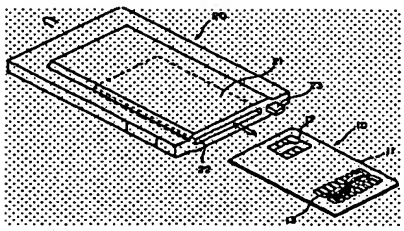


Fig. 2
【図2】



【図3】 Fig. 3



【図4】

Fig. 4